



3.5/5

43
Pa

70/100
Seventy only

Physical_Chemistry_2nd_YUGS_EV_ST



Name of a student تبارك عبد الرحمن Signature Tabarik No. 5

Mustansiriyah University
Department of Chemistry

1st SEM-2025_Bologna_Process
Mid_Exam_Class_A_Paper_A

Q1: Circle the right answer for all of the following

(50 Marks)

1: liquefaction of the gas means which of the following?

- (a) $Z = 1$
- (b) $Z > 1$
- (c) $Z < 1$
- (d) $Z \neq 1$

2: In the van der Waals equation, what is the correct formula for the volume of the gas?

- (a) n_i/n_T
- (b) V
- (c) V/m
- (d) V/n

3: If a gas has polar particles, then the difference between the volume of this gas is:

- (a) $V_{\text{Real}} > V_{\text{Perfect}}$
- (b) $V_{\text{Real}} < V_{\text{Perfect}}$
- (c) $V_{\text{Real}} = V_{\text{Perfect}}$
- (d) $V_{\text{Real}} \neq V_{\text{Perfect}}$

4: It can classify the type of reaction within adiabatic process as:

- (a) reversible
- (b) isobaric
- (c) isothermal
- (d) free expansion

5: If it is required to measure the work done in an isochoric process, the value of work will be:

- (a) zero
- (b) one
- (c) two
- (d) three

6: In a completely insulated system, the work done is in contact with which of the following?

- (a) gas
- (b) system
- (c) surrounding
- (d) pressure

7: When the internal pressure of the system is equal to atmospheric pressure, the actual value will be:

- (a) zero
- (b) one
- (c) two
- (d) three

8: During an isothermal reversible process, the change in temperature of the system is?

- (a) variable
- (b) equal to zero
- (c) 25°C
- (d) constant

9: Heat capacity is extensive property while molar heat capacity is ----- property:

- (a) proportional
- (b) intensive
- (c) extensive
- (d) direct

10: When $\Delta H = \text{zero}$, the process is:

- (a) isobaric
- (b) isochoric
- (c) isothermal
- (d) adiabatic

Q2: Using van der Waals equation, calculate the temperature of 5.0 mol of an unknown gas in a 5.0 L container at 80 bar. Compare this temperature with the value obtained from the ideal gas equation.

$a = 0.0341 \text{ L}^2 \text{ atm mol}^{-2}$; $b = 0.0237 \text{ L mol}^{-1}$.

(25 Marks)

Q3: 1100 J of heat energy was applied to (50 g, 27 g mol^{-1}) of aluminum metal. The temperature increased from 25°C to 45°C . Calculate $C_{p,m}$ of aluminum.

(25 Marks)

Q2) $n = 5 \text{ mol}$, $V = 5 \text{ L}$, $P = 80 \text{ Bar}$ $a = 0.0341 \text{ L}^2 \text{ atm mol}^{-1}$
 $b = 0.0237 \text{ L}^2 \text{ atm mol}^{-1}$ $T = ?$

~~$(P + \frac{an^2}{V^2})(V - nb) = nRT$~~

~~$80 + \frac{0.0341 \times (5)^2}{(5)^2} (5 - 5 \times 0.0237) = T$~~ $Q_2 \frac{10}{2905}$

~~$T = 80 + 0.0341 \times 4.8815$~~
 ~~$T = 80.0341 \times 4.8815 \Rightarrow T = 390.68 \text{ K}$~~

~~$PV = nRT$~~ ? = units
 ~~$80 \times 5 = 5 \times 0.082 \times T$~~ $400?$
 ~~$T = 975.60 \text{ K}$~~ $0.41?$
 How do you know?

Q3) $\Delta T = T_f - T_i \Rightarrow \Delta T = 45 - 25 \Rightarrow \Delta T = 20 \text{ K}$
 $q = 1100 \text{ J}$, $m = 50 \text{ g}$, $M = 27 \text{ g/mol}$

~~$q = n C_{p,m} \Delta T$~~
 ~~$C_{p,m} = \frac{q}{n \Delta T}$~~
 ~~$C_{p,m} = \frac{1100}{1.85 \times 20 \text{ K}}$~~
 ~~$C_{p,m} = \frac{1100}{37 \text{ mol} \cdot \text{K}}$~~

~~$n = \frac{m}{M}$~~
 ~~$n = \frac{50}{27}$~~
 ~~$n = 1.85 \text{ mol}$~~

How do you know?

~~$C_{p,m} = 29.729 \text{ J/mol} \cdot \text{K}$~~